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OFFICE OF CHEMICAL SAFETY AND POLLUTION PREVENTION

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OFFICE OF PESTICIDE PROGRAMS

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DRINKING WATER EXPOSURE CONCENTRATIONS

SUBJECT: Drinking Water Exposure Concentrations for Proposed New Myclobutanil Uses on Grass Grown for Seed, Grass Pastures, Rangeland, and Sod Farms

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Executive Summary

The Environmental Fate and Effects Division (EFED) has prepared a drinking water assessment for proposed new uses of the fungicide myclobutanil (Rally® 40 WSP[1]) on grass grown for seed, grass pastures, rangeland, and sod farms. Myclobutanil transformation products include 1,2,4-triazole and triazole conjugates (triazole alanine and triazole acetic acid), which are common to the conazole class of compounds. Myclobutanil residues were individually evaluated in this

[1] Supplemental Labeling Rally 40WSP, EPA Reg. No. 62719-410 (Submission # 909130)

drinking water assessment (DWA). In addition to the proposed new uses, the currently registered maximum use rate is for turfgrass (EPA Reg. Nos. 62719-461, 42750-166, 62719-417) is also reassessed to reflect the current label rates.

The Tier 2 PRZM/EXAMS model was used to reassess the EDWCs for the current turfgrass use rates which represents the highest myclobutanil use rates, as the previous drinking water EDWCs (D289700) had been based upon higher turf application rates and used the FIRST model. The recommended EDWCs for myclobutanil for surface water are 217.8 µg/L, 172.2 µg/L, and 117.2 µg/L, for acute, annual average, and long-term average, respectively. The Tier 2 acute exposure concentration (217.8 µg/L) is less than previously determined in the Tier 1 model (333 µg/L). The Tier 2 long term (117 µg/L for a 30-year average) is slightly higher than chronic/cancer value estimated with the Tier 1 model (86 µg/L) which reflects the additional fate data and increased PCA (turf plus agricultural land).

Summary of Modeling Results

A Tier 1 (FIRST) screening-level surface water DWA was conducted for the proposed new uses for parent myclobutanil, as well as for the individual triazole degradates. The estimated drinking water concentrations (EDWC) in surface water for acute and chronic/cancer exposure for the proposed new myclobutanil uses are 47 µg/L and 17 µg/L, respectively (**Table 1**). The peak groundwater EDWC for myclobutanil using PRZM-GW is 4.28 µg/L, with a post-breakthrough average concentration of 0.93 µg/L (**Table 1**).

The proposed maximum new use rate for grass grown for seed (4 applications at 0.20 lb a.i./A; total 0.80 lb a.i./A/season; minimum 14-day reapplication interval) is lower than maximum rates currently registered for other uses, including turfgrass. Higher EDWCs were previously recommended by EFED for use in human dietary exposure estimates (see **Table 2**). These EDWCs were estimated using the FIRST model and applying a PCA (percent cropped area) of 0.87 (D289700[2]). The highest EDWCs were based up a maximum turf rate of 0.65 lb a.i./A, 15 applications per year and 9.75 lb a.i./A/year; however, these rates are no longer on current labels (EPA Reg. No. 62719-461, 42750-166, 62719-417). The maximum single application rate for turf is 1.3 lb a.i./A with a yearly maximum of 7.84 lb a.i./A, and minimum reapplication interval of 14 days. Because of this change in application rate and the consideration of new fate data, the turf use (maximum rate) was reassessed for surface water (**Table 2**) using PRZM/EXAMS. The registrant has submitted additional environmental fate data, an aerobic aquatic metabolism study, which was incorporated into the reassessment.

[2] DP Barcode D289700. Nguyen, T. and Costello, K. June 9, 2003. Emergency Exemption Review: Myclobutanil on Peppers in California.

Table 1. Maximum Tier I myclobutanil EDWCs and residues of concern for drinking water assessment based on aerial application of myclobutanil for the proposed new use on grass grown for seed, grass pastures, rangeland, and sod farms.

Use	Exposure	Maximum Surface water EDWC Using FIRST (µg/L)		Maximum Groundwater Acute/Chronic EDWC Using SCI-GROW (µg/L)
		Acute Value	Chronic/Cancer Value	
Grass Grown for Seed, Grass Pastures, Rangeland, and Sod Farms	Parent Only	46.9	17.1	1.13
Grass Grown for Seed, Grass Pastures, Rangeland, and Sod Farms	1,2,4-Triazole[a]	5.3	1.72	0.24
	Triazole Acetic Acid[b]	9.74	3.16	0.44
	Triazole Alanine[c]	11.98	3.88	0.54
		Maximum Groundwater EDWC PRZM-GW[d] (µg/L)		
		Highest Daily Value	Simulation Average	Post-Breakthrough Average
Grass Grown for Seed, Grass Pastures, Rangeland, and Sod Farms	Parent Only	4.28	0.90	0.93
	1,2,4-Triazole	3.79	2.35	2.43
	Triazole Acetic Acid	6.97	4.32	4.47
	Triazole Alanine	8.58	5.32	5.50

[a] Using the same environmental fate values used by Maher et al. 2006. 1,2,4-Triazole application was obtained from molecular weigh conversion times myclobutanil application rate times max percent formation rate (turf = 4 applications @ (69.0/288.78) * 0.20 * 0.307)).

[b] Triazole Acetic Acid = (127.10/69.0)*1,2,4-Triazole concentration.

[c] Triazole Alanine = (156.15/69.0)*1,2,4-Triazole concentration.

[d] Groundwater scenario with the highest EDWCs (**Table 9).**

The Tier 1 EDWCs from previous DWAs including the use of myclobutanil at the maximum turf rate (a rate lower then the rate used in the 1,2,4-triazole assessment) and tropical fruits are summarized in (**Table 2**). The Tier 2 PRZM/EXAMS model was used to reassess the EDWCs for the current turfgrass use rates which represents the highest myclobutanil use rates, as the previous drinking water EDWCs (D289700) had been based upon higher turf application rates and used the FIRST model. The Tier 2 acute exposure concentration (217.8 µg/L) is less than previously determined in the Tier 1 (333 µg/L) **(Table 2)**. The Tier 2 long term (117 µg/L for a 30-year average) is slightly higher than chronic/cancer value estimated with the Tier 1 model (86 µg/L) **(Table 2**) which reflects the additional fate data (**Table 8**) and increased PCA (turf plus agricultural land). The proposed new use was also evaluated with PRZM/EXAMS to ensure that the Tier 1 concentrations were conservative. The triazole degradation products were not reconsidered in the DWA when the maximum turf use rates were previously assessed (D289700).

The recommended EDWCs for myclobutanil are summarized in **Table 2** (in bold). For surface water, the exposure concentrations for myclobutanil are 217.8 µg/L, 172.2 µg/L, and 117.2 µg/L, for acute, annual average, and long-term average, respectively. Groundwater EDWCs were lower than the surface water estimates (**Table 2**).

Table 2. Myclobutanil EDWCs for Uses Previously Determined and the EDWCs (µg/L) for the Reassessed Current Turf Use and Proposed New Use. (Recommended EDWCs for drinking water exposure in Bold)

Use (DP Barcode)	Previously Determined EDWCs Maximum Surface water EDWC) (FIRST model)			Maximum Ground water Acute/Chronic EDWC (SCI-GROW model)	
	Acute Value	Chronic/Cancer Value			
Indicated as Hops (D289700)[1,2]	333	86		3.2	
Tropical Fruit (D336254)[3]	120.1	46.3		2.83	
	Reassessed and Proposed New Use EDWCs				
	PRZM/EXAMS			PRZM-GW	
Scenario	1-year in 10-year		30 Year Ave		Post Breakthrough
	Acute	Annual Ave		Acute	Ave
PA Turf[4] – for turfgrass	**217.84**	**172.2**	**117.2**	41.5	9.0
PA Turf[5] – for grasses grown for seed	28.35	21.22	13.29	4.28	0.93

[1] Previous maximum turf application rate: 15 applications at 0.65 lb a.i./A: 14 day interval, PCA = 0.87, aerobic soil metabolism half-life – 81 days, aerobic aquatic metabolism half-life – 162 days, and K_d – 2.39 mL/g..

[2] Assessment included a revised drinking water assessment for turf (maximum use rate) using the Tier 1 drinking water model FIRST instead of the GENEEC.

[3] Application rate: 8 applications @ 0.25 lb a.i./A; 14 day interval, and fate data from Table 8

[4] Turf use 6 applications at 1.3 lb a.i./A; yearly max of 7.8 lb a.i./A/year with a 14 day reapplication interval (EPA Reg. No. 62719-417); PCA = 0.95, and fate data from Table 8.

[5] Proposed New Use (grass grown for seed, grass pastures, rangeland, and sod farms) 4 applications at 0.20 lb a.i./A; yearly maximum 7.84 lb a.i./A/year with 14 day reapplication interval; PCA = 0.95, and fate data from Table 8.

Previously, the Office of Pesticide Program's Health Effects Division (HED) conducted an aggregate human health risk assessment for 1,2,4-Triazole and its triazole conjugates[3] (triazole alanine and triazole acetic acid) which are common metabolites to the class of compounds (including myclobutanil) know as the conazoles (D322215[4]). For the aggregate human health assessment EFED prepared a Tier II (PRZM/EXAMS) drinking water assessment for 1,2,4-triazole (D320682[5]). In the absence of fate studies for triazole conjugates and in the light of potential interconversion from 1,2,4-triazole to triazole conjugates, the concentrations of triazole alanine and triazole acetic acid were derived conservatively assuming 100% conversion from 1,2,4-triazole to conjugates and using molecular weight conversion from 1,2,4-triazole to triazole conjugate. Since the myclobutanil rates for these proposed new uses are less than used in the 2006 aggregate assessment (6 applications @ 1.73 lb a.i./A; total 10.38 lb a.i./A; 14-day reapplication interval; Pennsylvania Turf scenario, the EDWCs for the triazoles based on this new use are less than those previously recommended (see **Table 3**). Because the use rates

[3] PC Code: 600074 – 1,2,4-Triazole; 600011 – Triazole Alanine; 600082 – Triazole Acetic Acid

[4] DP Barcode D322215. Michael Doherty et al., February 7, 2006. 1,2,4-Triazole, Triazole Alanine, triazole Acetic Acid: Human Health Aggregate Risk Assessment in Support of Reregistration and Registration Actions for Triazole-derivative Fungicide Compounds.

[5] DP Barcode D320682. I. Maher et al., February 28, 2006. 1,2,4-Triazole, Triazole Alanine, Triazole Acetic Acid: Drinking Water Assessment in Support of Reregistration and Registration Actions for Triazole-derivative Fungicide Compounds

proposed for the new use are less than those previously addressed in the aggregate exposure assessment, the 1,2,4-Triazole and its triazole conjugates (triazole alanine and triazole acetic acid) EDWCs would be expected to be lower than what was previously estimated in the triazole aggregate assessment. (**Table 3**)

Table 3. Tier 2 PRZM/EXAMS Estimated Drinking Water Concentrations for 1,2,4-Triazole, Triazole Acetic Acid, and Triazole Alanine from the Triazole Aggregate Assessment (D320682)

Use[a]	Exposure	Estimated Drinking Water Concentrations (µg/L)		
		1 in 10 year annual peak	1 in 10 year annual mean	36 year annual mean
Golf Course Turf	1,2,4-Triazole	41.0	11.0	2.69
	Triazole Acetic Acid (TAA)	75.4	20.2	4.95
	Triazole Alanine (TA)	92.7	24.9	6.08

[a] Golf Course Turf PA golf course turf scenario; application rate based upon 6 applications of myclobutanil @ 1.73 lb a.i./A; 10.38 lb a.i./A/yr. /1,2,4-Triazole application was obtained from molecular weigh conversion times myclobutanil application rate times max percent formation rate (turf = (69.0/288.78) * 1.73 * 0.307)

[b] TAA = (127.10/69.0)*1,2,4-Triazole concentration.

[c] TA = (156.15/69.0)*1,2,4-Triazole concentration

EDWCs for myclobutanil in groundwater are estimated with PRZM-GW and SCI-GROW. Until the use of PRZM-GW is fully implemented to replace SCI-GROW for modeling potential groundwater concentrations, Tier 1 estimates using both the Tier 1 SCI-GROW and the Tier 1/Tier 2 PRZM-GW models are presented here **(Table 1).** The increased estimates of the groundwater concentration between the models is in due in part because the Tier 1 PRZM-GW model considers use for multiple (30) years, whereas SCI-GROW considers only one year of applications, regardless of multiple applications year after year.

Surface and ground water monitoring programs which have included myclobutanil have also been investigated. Myclobutanil has been detected in ambient surface water and groundwater in samples collected for the USGS's National Water Quality Assessment Program (NAWQA, 2007). Detection levels in the available monitoring data are lower than the values modeled with the respective Tier 1 and 2 surface water and groundwater models.

II. PROBLEM FORMULATION

This Tier I drinking water assessment uses modeling to provide estimates of surface and ground water concentrations of potential myclobutanil residues in drinking water source water (pre-treatment) that may result from the proposed new uses of myclobutanil. Available monitoring data are used to support that the modeling estimates are conservative with respect to exposure. Primary routes of transport to source water include runoff, leaching, and spray drift. The screening level estimates of the drinking water concentrations (EDWCs) for myclobutanil were obtained with the Tier I surface water ($FIRST_{v.1.1.0}$) and groundwater ($SCI\text{-}GROW_{v.2.3}$ and $PRZM\text{-}GW_{v.1}$) models. The assessment was conducted as a national assessment using the high-end exposure conditions represented by the FIRST and PRZM-GW models and the maximum

application rates. The Tier 2 PRZM/EXAMS model was used to provide EDWCs which reflect the currently registered turfgrass use (the highest maximum) rates.

III. ANALYSIS

Use Characterization

The myclobutanil label considered in this assessment is RALLY® 40 WSP (EPA Reg. No. 62719-410). Myclobutanil is proposed for use on grass grown for seed, grass pastures, rangeland, and sod farms to control powdery mildew. The proposed methods of myclobutanil application are by ground and aerial foliar spray, as well as sprinkler irrigation (chemigation).

The rates proposed for this use are given in **Table 4**. The individual application rates range from 0.125 to 0.20 lb a.i./A. The number of applications range from 4 to 6, depending on the single application rate; the minimum reapplication interval ranges from 14 to 21 days. The maximum proposed seasonal application rate is of 0.80 lb a.i./A.

Table 4. Proposed new uses and use patterns of myclobutanil under Supplemental labeling, Rally 40 WSP, [EPA Reg No. 62791-410] (PC 128857 D403754)

New Use – Crop Groups, crops	Application Method	Max # Appl. /Interval	Rate/Season Rate (lb a.i./A)
Grass grown for seed, grass pastures, rangeland, and sod farms	Aerial, ground spray and chemigation	6 /14 to 21 days	0.125-0.20 / 0.8

Mode of Action

Myclobutanil is a triazole fungicide in the conazole class of fungicides which is a systemic fungicide used to control powdery mildew on a number of crops. Myclobutanil appears to be a specific inhibitor of sterol 14-demethylase, which disrupts the ergosterol biosynthesis pathway which is vital to fungal cell wall formation. It is classified as a demethylation inhibitor (DMI) fungicide.

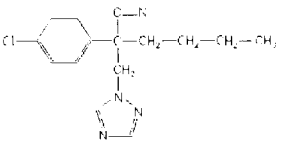
Fate and Transport Characterization

Myclobutanil environmental fate data is generally complete and is summarized below **(Tables 5 and 6.** Myclobutanil is expected to dissipate through leaching, runoff, spray drift, and to a lesser extent microbial mediated degradation. It is stable to hydrolysis and to photolysis. Myclobutanil degradation is controlled by microbial-mediated transformation. Myclobutanil is moderately persistent to persistent in aerobic soils and persistent in anaerobic soils. The major degradation product observed in the aerobic soil metabolism studies was 1,2,4-triazole. Other degradation products were CO_2, β-4-chlorophenyl-β-cyano-γ-(1H-1,2,4-triazole)-butyric acid, unknown, or non-extractable residues. The myclobutanil showed very little degradation/metabolism for the

total system (water/sediment) in the aerobic/anaerobic aquatic metabolism study with an average half-life of 630 days (extrapolated from a 105 day study).

Terrestrial field dissipation half-life values ranged from 92 to 292 days. The potential for accumulation in soil is possible due to the persistence, especially when there are multiple applications.

Table 5. Selected Physiochemical, Fate and Transport data for Myclobutanil.

Parameter	Input Value and Unit	Source (Classification)[1]
Chemical Formula: Myclobutanil: alpha-butyl-alpha (4-chlorophenyl)-1H-1,2-triazole-1-propane-nitrile		
Chemical Structure: Myclobutanil		
Molecular Weight	288.8 g/ mol	DP Barcode D289700
Solubility in water (pH 7, 20°C)	142 mg/L	DP Barcode D289700
Vapor Pressure (@ 25 °C)	<9.75 x 10^{-6} mmHg (torr)	MRID 46802501
Henry's Constant (25 °C)	2.6 x 10^{-8} atm m^3/mol	calculated
161-1 Hydrolysis at pH 5,7, and 9	Stable	MRID 00141679 (a)
161-2 Aqueous photolysis ($t_{1/2}$)	Stable	MRID 40641501 (a), MRID 40319801 (a), MRID 40528801 (a)
161-3 Soil Photolysis ($t_{1/2}$)	Extrapolated to143 days	MRIDs 164987, 164988 Acc No. 266121 (a), Rec No. 214084 (a) (D197478)
162-1 Aerobic Soil Metabolism ($t_{1/2}$)[2]	198, 224 days	MRID 001416-80 (a) MRID 164561 Rec No. 265748 (a)
162-3 Anaerobic Soil Metabolism ($t_{1/2}$)	Assumed Stable, No appreciable degradation in 62 days	MRID 00141680 DP Barcode D289700
162-3 Anaerobic Aquatic Metabolism ($t_{1/2}$) [sediment layer]	Total System Half-lives Pond: 841.8 days River: 416.8 days	MRID 47454401 (s)
162-4 Aerobic Aquatic Metabolism ($t_{1/2}$) [water column]		
164-1 Terrestrial field dissipation ($t_{1/2}$)	92 to 292 days	MRID 164563 (a)

[1] Classification: (a) Acceptable and (s) Supplemental

[2] ($t_{1/2}$) – Myclobutanil decline does not follow first-order kinetics, therefore the decay rate is not a half-life. Estimate of DT_{50} dependent upon method used to determine value (**See Appendix 1**).

The Freundlich K_{ads} values for myclobutanil ranged from 1.46 to 9.77 mL/g (**Table 6**). The lowest non-sand value is 2.39 mL/g. The average K_{ads} and K_{oc} were 5.03 mL/g and 520.2 mL/g_{oc}, respectively. The sorption of myclobutanil is not strongly correlated (R^2 = 0.44) to soil organic carbon, therefore K_{ads} is used for modeling.

Table 6. Measured Freundlich K_{ads} and K_{oc}, and Desorption for Myclobutanil and Soil Textural class, Organic Matter (MRID # 00141682).

Sorption		Soil Properties	
K_{ads} mL/g	Koc[1] ml/$g_{organic\ carbon}$	OM%	Texture Class
2.39	936	0.44	Clay
1.46	265	0.95	Sand
7.08	595	2.05	Silty loam
9.77	581	2.9	Sandy loam
4.44	224	3.42	Clay loam
average =5.03 std = 3.42 std/ave = 0.68	average = 520.2 std = 289.41 std/ave = 0.56	-	-

[1] K_{oc} = (K_d/(%OM/1.724)) * 100 where K_{ads} is assumed to equal to K_d and OC% = OM%/1.724
[2] Regression: p = 0.22; K_{ads} vs. OC; R^2 =0.44

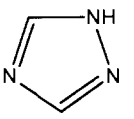
Because log K_{ow}s for parent and degradation products are low (log K_{ow}= 2.94), myclobutanil is not expected to bioaccumulate (MRID 00162541).

Metabolites

The major degradation products of myclobutanil observed in the aerobic soil metabolism (ASM) studies were 1,2,4-triazole (maximum 18%), CO_2, a polar degradate (β-4-chlorophenyl-β-cyano-γ-(1H-1,2,4-triazole)-butyric acid; maximum 9 %), and unextractable residues. At the conclusion of the 367 day ASM study, 29 to 33 percent of the applied radioactivity remained as parent myclobutanil and 13 percent was identified as 1,2,4-triazole.

1,2,4-triazole and its conjugates are common metabolites to the class of compounds know as the conazoles. The environmental fate data for the "Residue of Concern" 1,2,4-triazole are list in **Table 7**. Detailed information concerning the environmental fate of 1,2,4-triazole can be found in 1,2,4-Triazole, Triazole Alanine, Triazole Acetic Acid: Drinking Water Assessment in Support of Reregistration and Registration Actions for Triazole-derivative Fungicide Compounds (Maher et al., 2006; D320682).

The environmental fate database for 1,2,4-triazole was generally sufficient to conduct drinking water assessment. No separate laboratory and fate studies were submitted for triazole conjugates (triazole alanine and triazole acetic acid) degradation products for myclobutanil. Hence the Tier 2 PRZM/EXAMS modeling could not be performed for triazole alanine and triazole acetic acid as degradation products of myclobutanil. Therefore, the triazole alanine and triazole acetic acid concentrations were estimated my assuming 100 % conversion of the 1,2,4-triazole and adjusting by molecular weight as described below.

Table 7. Summary of Environmental Fate and Chemistry and Model Input Parameters for 1,2,4-Triazole		
Parameters	Input Value and Unit	Source of Info/Reference[6]
1,2,4-Triazole		
Application Rate	0.0147[1] lb a.i./A per application	after Maher et al. 2006[1] (see discussion in Background on Aggregate Triazole Drinking Water Assessment section)
Soil Partition Coefficient (K_f)[2]	0.72 mL/g (K_{ads} 0.7 to 0.8) (K_{des} 0.8 to 7.9) median K_{oc} =104 mL/g_{oc}	MRID 40891501
Molecular Weight	69.07 g/mole	MRID 45574104
Solubility (pH 7, 20 °C)	7,000,000 mg/l	MRID 45574104
Vapor Pressure at 20 °C	1.65 x 10^{-3} mm Hg	MRID 45574104
Henry's Law Constant at 20 °C	1.97 x 10^{-10} atm·m^3/mol	MRID 45574104
Aerobic Soil Metabolism ($t_{1/2}$)	250 days[3] 107 days[4]	MRIDs: 45284032, 45297203, 45284027 MRIDs: 45284032, 45284027
Aqueous Photolysis (pH 5) ($t_{1/2}$)	stable	MRID 45284026
Hydrolysis ($t_{1/2}$) (pH7)	161 days	MRID 43241019
Aerobic aquatic metabolism half-life ($t_{1/2}$)	500 days[5] 214 days[6] **Note: For this new use only**: set to 0 for stable	Assumed 2 x aerobic soil metabolism half-life input value because the compound is stable to hydrolysis and no aerobic aquatic metabolism data are available (Guidance for Selecting Input Parameters in Modeling the Environmental Fate and Transport of Pesticides; Feb 2, 2002) **Note: New Use only** Did not use in FIRST set to stable and entered hydrolysis half-life @ pH 7 (161 days)
Anaerobic aquatic metabolism half-life[7] ($t_{1/2}$)	504 days	Assumed 2 x anaerobic soil metabolism half-life multiplied by three ($t_{1/2}$ = 84 days, MRID 45930701) because no anaerobic aquatic metabolism data are available and the compound is stable to hydrolysis (Guidance for Selecting Input Parameters in Modeling the Environmental Fate and Transport of Pesticides; Feb 2, 2002)

[1] – 1,2,4-Triazole application rate was obtained from molecular weight conversion times myclobutanil application rate times max percent formation rate (turf = (69.0/288.78) * 1.73 lb a.i./A * 0.307; this assessment = ((69.0/288.78) * 0.20 lb a.i./A * 0.307) = 0.0147 lb a.i./A).

[2] – The lowest non-sand K_F value was used.

[6] Maher et al., 2006. Memorandum: 1,2,4-Triazole, Triazole Alanine, Triazole Acetic Acid: Drinking Water Assessment in Support of Reregistration and Registration Actions for Triazole-derivative Fungicide Compounds. DP Barcode: D320682, February 28, 2006.

[3] – Upper 90 percentile confidence bound of the mean metabolism half-life from all half-lives available ($t_{1/2}$ (6) = 26.5; 46.7; 22.2; 343, 375; and 155 days) was used [median value = 101 days].
[4] – Upper 90 percentile confidence bound of the mean metabolism half-life and from all but the highest concentration half-lives ($t_{1/2}$ (4) = 26.5; 46.7; 22.2; and 155 days) was used [median value = 36 days].
[5] – Aerobic soil metabolism half-life input x 2 = 250 * 2 = 500 days
[6] – Aerobic soil metabolism half-life input x 2 = 107 * 2 = 214 days
[7] – Only one anaerobic soil metabolism half-life was available (84 days, MRID 45930701)

Drinking Water Exposure

Background on Aggregate Triazole Drinking Water Assessment

For the aggregate human health assessment a Tier 2 (PRZM/EXAMS) drinking water assessment was performed for 1,2,4-triazole and triazole conjugates, *i.e.*, triazole alanine and triazole acetic acid derivative fungicide compounds (D320682). The modeling scenario (Maher et al., 2006, D320682) was based on the following: (1) assuming 30.7% conversion from parent myclobutanil to 1,2,4-triazole and (2) using molecular weight conversion to adjust from parent application rate to 1,2,4-triazole application rate. Based on the laboratory and field studies, triadimefon had the highest conversion percentage (30.7%) to form 1,2,4-triazole among nine triazole-forming fungicides (difenoconazole, tebuconazole, triadimefon, triadimenol, propiconazole, myclobutanil, prothioconazole, fenbuconazole, and tetraconazole). For modeling, myclobutanil was chosen because it has the highest annual application rates for non-agricultural (turfgrass) and agricultural crop (apples) uses of all conazole fungicides. The aggregate assessment was based upon myclobutanil using a maximum application rate of 1.73 lb a.i./acre applied six times per season in 14 day intervals (Note: this is a higher rate than used for myclobutanil in this assessment). This aggregate triazole assessment may require revision if any future uses are for sites not already addressed by the current list of registered or proposed uses, if the application rates of the fungicides exceed 10.38 lb a.i./acre annually for non-agricultural uses and 2.0 lb a.i./acre annually for agricultural uses, or if the formation of the metabolites exceeds 30.7%.

Modeling Exposure for Proposed Uses of Myclobutanil and its Triazole Conjugates

Tier 1 EDWCs were obtained for parent myclobutanil and 1,2,4-triazole and triazole conjugates for surface water and groundwater for the proposed new use. The maximum application rate on grass grown for seed, grass pastures, rangeland, and sod farms is 0.20 lb a.i./A applied with a season maximum of 0.8 lb a.i./A and a 14 day reapplication interval. In the absence of fate studies for triazole conjugates and in the light of 1,2,4-triazole interconversion to triazole conjugates, the concentrations of triazole alanine and triazole acetic acid were derived assuming 100% conversion from 1,2,4-triazole to conjugates and using molecular weight conversion from 1,2,4-triazole to triazole conjugate. The assessment for the new use also used the fate properties used by Maher et al. (2006), but application rate inputs were based on the proposed new use rates.

Modeling

EFED Tier I models[7] were used to estimate the drinking water exposure for use in the dietary risk assessment of myclobutanil. The following is a description of the models used, the selection of the model input parameters, and a characterization of the output from these simulations.

Surface Water: The FIRST[8] (FQPA Index Reservoir Screening Tool, Version 1.1.0) model was used to assess potential for contamination of surface drinking water sources by myclobutanil and 1,2,4-Triazole from the proposed new use. The Tier 2 PRZM/EXAMS[9] model was previously used for the 1,2,4-Triazole aggregate exposure assessment (Maher et al.2006, D320682). Myclobutanil concentrations were also reassessed at the current labeled maximum rate for turf (1.3 lb a.i./A, 6 applications per year, and maximum rate of 7.8 lb a.i./A/year) with PRZM/EXAMS , updated from when turfgrass was previously assessed with a higher maximum rate for the turf use was 0.65 lb a.i./A with 15 applications per year, and 9.75 lb a.i./A/year, and a PCA of 0.87 (D289700[10]).

Groundwater: Myclobutanil concentrations in groundwater were estimated by the Screening Concentration in Groundwater (SCI-GROW[11] v2.3, Jul. 29, 2003) model. The output of SCI-GROW represents the concentrations myclobutanil residues that might be expected in shallow unconfined aquifers under sandy soils. However, SCI-GROW does not consider multiple years of application pesticide application and does not estimate a peak concentration.

For groundwater assessments, EFED is using both the SCI-GROW model and PRZM-GW. PRZM-GW can be used for Tier 1 and 2 assessments and additional refinements, provided data are available. Multiple scenarios (like surface water) can also be considered. PRZM-GW also allows for modeling multiple years of application. For groundwater exposure modeling, drinking water from a rural drinking water well located beneath an agricultural field (a high pesticide use area) drawing from an unconfined, high water-table aquifer, (*i.e.*, the PRZM-GW conceptual model representing a private well) would typically not undergo a chlorination water treatment process. PRZM-GW does not consider dilution within the aquifer and or degradation process other than aerobic soil metabolism in the upper meter of the soil, unless data are available for other processes with the vadose zone or within the aquifer.

[7] http://www.epa.gov/oppefed1/models/water/

[8] http://www.epa.gov/oppefed1/models/water/#first

[9] http://www.epa.gov/opp00001/science/models_pg.htm

[10] DP Barcode D289700. Nguyen, T. and Costello, K. June 9, 2003. Emergency Exemption Review: Myclobutanil on Peppers in California.

[11] http://www.epa.gov/oppefed1/models/water/#scigrow

Input Parameters

Model input parameters were estimated from the fate and transport properties given **Tables 5 and 6** and the other default values are selected as recommended by EFED Input Guidance document (USEPA, 2009). Pesticide usage information was obtained from the draft labels. The inputs values used in FIRST, PRZM/EXAMS, SCI-GROW, and PRZM-GW models are summarized in **Table 8**.

In the DWA for Tropical Fruit (D336254) the aerobic aquatic metabolism half-life was assumed to be twice that of the aerobic soil metabolism half-life ($t_{1/2}$ = 502 days) (**Table 8**). However since the last assessment (D336254) an aerobic/anaerobic aquatic metabolism study was submitted (MRID 47454401). Myclobutanil showed very little degradation/metabolism for the total system (water/sediment), as less than 1% $^{14}CO_2$ was produced during the study. The 90 percent upper bound on the mean aerobic aquatic metabolism half-life was 1283 days. The degradation products 1,2,4-triazole and its triazole conjugates were not observed in the aerobic/anaerobic aquatic metabolism study.

Table 8. Input parameters for the Tier I FIRST[1], SCI-GROW[1] and PRZM-GW models used in Parent Myclobutanil Drinking Water Assessment.

Input	Value	Rationale
Application rate/number/interval	0.20 lb a.i.A^{-1} /4/14 days	Maximum proposed label use
Incorporation depth	0	USEPA, 2009
Hydrolysis	0 (stable)	USEPA, 2009
Aquatic Photodegradation	0 (stable)	USEPA, 2009
Solubility	142.0 mg/L	USEPA, 2009
Aerobic Soil Metabolism ($t_{1/2}$) Myclobutanil	251 days	= Upper 90th bound on mean
Aerobic Aquatic Metabolism ($t_{1/2}$) Myclobutanil	Assumed to be stable based upon aerobic/anaerobic metabolism study 1283.48[2] days	= Assumed to be stable USEPA, 2009 for FIRST Model Not used in PRZM-GW Upper 90th bound on mean of PRZM/EXAMS for turf assessment EFED Guidance (USEPA, 2009) (MRID 47454401)
Anaerobic Aquatic Metabolism ($t_{1/2}$)	0 Stable	= Assumed stable to be conservative
Mobility (Freundlich K_{ads}) Myclobutanil	5.03 mL/g	For FIRST Model = Average K_d For PRZM-GW =Average K_d
Mobility (K_{oc}) Myclobutanil	224 mL/g_{oc}	For SCI-GROW[3] = Lowest Koc
Aerial Spray Drift	0.16 (fraction)	USEPA, 2009 (FIRST)
Wetted In	No	Label

Table 8. Input parameters for the Tier I FIRST[1], SCI-GROW[1] and PRZM-GW models used in Parent Myclobutanil Drinking Water Assessment.		
Input	**Value**	**Rationale**
PCA (Percent Crop Area)	0.95 (fraction)	USEPA, 2012

[1] In the 2003 DWA[12] the aerobic soil metabolism half-life was 81 days, the aerobic aquatic metabolism half-life was 162 days, and the PCA was 0.87.
[2] Used to reassess the current maximum turf rate (6 applications at 1.3 lb a.i./A).
[3] SCI-GROW input specifies a Koc rather than K_{ads} as an input value.

Modeling Results

The drinking water exposure concentrations for myclobutanil for the proposed uses on grass grown for seed, grass pastures, rangeland, and sod farms at the maximum use rate (4 applications at 0.20 lb a.i/A, 14 day reapplication interval) produced lower EDWCs (**Table 9**) than the previously assessed turf scenario (**Table 3**). For parent myclobutanil, the EDWCs (surface water peak = 46.9 µg/L, chronic = 17.1 µg/L, and for groundwater acute = 4.28 µg/L and chronic = 0.93 µg/L) (**Table 10**).

Table 9. Tier I FIRST Model Surface Water EDWCs for Myclobutanil from Uses on Grass Grown for Seed, Grass Pastures, Rangeland, and Sod Farms					
Chemical	**Application**			**Peak Day (Acute)**	**Annual Average (Chronic)**
Surface Water	Rate (lb a.i./A)	Number	Interval (days)	Concentration (µg/L)	
Myclobutanil	0.20	4	14 days	46.9	17.1
1,2,4-Triazole[a]	0.20[a]	4	14	5.3	1.72
Triazole Acetic Acid	-			9.74[b]	3.16[b]
Triazole Alanine	-			11.98[c]	3.88[c]

[a] 1,2,4-Triazole application was obtained from molecular weight conversion times myclobutanil application rate times max percent formation rate (in this assessment: 1,2,4-Triazole = (69.0/288.78) * 0.20 lb a.i./A * 0.307));
[b] TAA = (127.10/69.0)*1,2,4-Triazole concentration.
[c] TA = (156.15/69.0)*1,2,4-Triazole concentration.

For 1,2,4-triazole, the EDWCs (surface water peak = 5.3 µg/L, chronic = 1.72 µg/L, and groundwater acute = 3.79 µg/L and chronic = 2.43 µg/L for groundwater be used for the human health exposure assessment (**Table 10**). The triazole acetic acid (TAA) and triazole alanine (TA) are then estimated by assuming 100 % conversion and adjusting for the difference in molecular weight (mass). The TAA concentration is equal to (127.10/69.0)*1,2,4-Triazole concentration and the TA concentration is equal to TA = (156.15/69.0)*1,2,4-Triazole concentration (**Table 1**).

[12] DP Barcode D289700. Nguyen, T. and Costello, K. June 9, 2003. Emergency Exemption Review: Myclobutanil on Peppers in California.

Table 10. PRZM-GW Tier I EDWCs (µg/L) for Myclobutanil and 1,2,4-Triazole from Uses on Grass Grown for Seed, Grass Pastures, Rangeland, and Sod Farms			
Scenario	Peak (Acute)	Simulation Average	Post-breakthrough Average
Myclobutanil[a]			
Delmarva Sweet Corn	0.03	0.003	0.003
FL Citrus	4.28	0.90	0.93
FL Potato 30 yr 100 yr	1.28 3.56	0.31 2.2	0.33 2.24
GA Peanut	0.0005	$4.4e^{-5}$	$5.1e^{-5}$
NC Cotton	0.002	0.0001	0.0001
WI Corn 30 yr 100 yr	$8.3e^{-10}$ 0.032	$4.6e^{-11}$ 0.003	$5.0e^{-11}$ 0.003
1,2,4-Triazole[b]			
Delmarva Sweet Corn	3.31	1.92	1.95
FL Citrus	3.79	2.35	2.43
FL Potato 30 yr	1.88	1.16	1.22
GA Peanut	0.23	0.12	0.13
NC Cotton	0.56	0.25	0.28
WI Corn 30 yr 100 yr	1.83 3.64	0.34 2.31	0.37 2.38

[a] Myclobutanil application rate: 4 applications @ 0.2 lb a.i./A)

[b] 1,2,4-Triazole application was obtained from molecular weight conversion times myclobutanil application rate times max percent formation rate (1,2,4-Triazole = (69.0/288.78) * 0.20 lb a.i./A * 0.307) = 0.01467 lb a.i./A)

The Tier 2 PRZM/EXAMS EDWCs for the currently registered turf uses are show in **Table 11** for the Pennsylvania and Florida Standard Turf scenarios. The highest 1-year in 10-year acute (peak) and annual mean concentrations were 218 and 172 µg/L, respectively for the PA Turf scenario. The 30 year mean for the same scenario is 117 µg/L.

Table 11. Tier 2 PRZM/EXAMS Surface Water EDWCs for Myclobutanil Use on Turfgrass for Currently Registered Maximum Use Rate.				
Scenario	apps; rate; interval (#; lb a.i./A; days)	1-Year in 10- Year Concentration (µg/L)		30 Year
		Peak	Annual Average	Average
PA Turf	6; 1.30;14	147.3	115.1	93.4
FL Turf	6; 1.30;14	217.8	172.2	117.2

PCA = 0.95

Monitoring

Three monitoring studies were found which included myclobutanil. Two studies were located at drinking water sources (treatment facilities); finished and raw water samples were analyzed. The

monitoring studies were not targeted to myclobutanil use areas. Myclobutanil has also been included in the USGS National Water-Quality Assessment Program (NAWQA) Program. Myclobutanil monitoring data are summarized in **Tables 11 through 14**.

USDA, Pesticide Data Program (PDP).

The PDP is a program implemented by the USDA in 1991 to test commodities in the U.S. food supply for pesticide residues (2001). Sampling of finished drinking water was added after 2001. The PDP is a partnership with cooperation State Agencies responsible for sample collection and analysis of fresh and processed fruit and vegetables, grain, grain products, milk and dairy products, beef, pork, drinking water, and bottle water. Ten to twelve states participate in PDP program. In 2005, the twelve states were CA, CO, FL, MD, MI, MN, MT, NY, OH, TX, WA, and WI.

Paired samples of raw (untreated) intake and disinfected finished (treated) water were collected for analysis by the PDP in 2004 and 2006. Treated water samples were collected after the untreated samples at a time interval with the hydraulic residence time. The frequency of myclobutanil detections was 2 percent for the treated water and 1 percent for the untreated water (**Table 12**) in the 2006 samples. There were no detections in any of the other years. Triazoles and its conjugates were detected in several food commodities, but not in water samples in the PDP study.

Table 12. Distribution of myclobutanil and 1,2,4-triazole residues in surface water drinking water sources in the USDA Pesticide Data Program (PDP) (USDA, 2001 - 2007).

Myclobutanil	No. of Samples	No. of Detects (year)	% samples with detection	Range of Detections[1] (µg/L)	Range of LODs (µg/L)
Finished (treated)	288	0 (2001)	0	0	0.0113 - 0.100
Finished (treated)	582	0 (2002)	0	0	0.005 - 0.020
Finished (treated)	782	0 (2003)	0	0	0.005 - 0.020
Finished (treated)	380	0 (2004)	0	0	0.0013 - 0.0113
Unfinished (untreated)	381	0 (2004)	0	0	0.0013 - 0.0113
Finished (treated)	230	4 (2005)	1.7	0.019	0.0050 - 0.0113
Unfinished (untreated)	232	2 (2005)	0.9	0.019	0.0050 - 0.0113
Finished (treated)	336	0 (2006)	0	0	0.005 – 0.05
Unfinished (untreated)	337	0 (2006)	0	0	0.005 – 0.05

[1] Only one distinct detected concentration or LOD value was reported for the pair.

Reservoir Pilot Monitoring Program (USGS, 2001). Myclobutanil was included in a study that monitored a number of water supply reservoirs and finished water (USGS, 2001). Residues were detected, at low concentrations, about 1 percent of 317 samples, in raw water with no detections in the finished water (**Table 13**). The degradation products were not included.

Table 13. Myclobutanil results from the summary of analysis of moderate-use pesticides and degradates in water samples from water supply intakes and finished-supply taps in Reservoir Pilot Monitoring Program. (USGS, 2001).

	No. of Samples	No. of Detections (Quantifiable No. of Detections)	Frequency of Detection (%)	Maximum Detection (µg/L)	Method Reporting Level (µg/L)
Raw Water	317	3 (2)	0.9	0.015	0.008
Finished Water	221	0	0	0	0.008

National Water Quality Analysis Program (NAQWA)(USGS, 2007)

Surface Water Analysis: Myclobutanil is detected in ambient surface water (**Table 14**) (Appendix 3). The detection frequency is 20.4 % (541/2647). The maximum daily myclobutanil concentration 0.507 µg/L is for a sampling site (USGS Sampling Station # 2335870) in Cobb County, GA. Land use in the Cobb County, GA watershed is designated as urban. The maximum average myclobutanil concentration is 0.347 µg/L for a sampling site (USGS Sampling Station # 3730112120393401) in Merced County, CA. The minimum reporting limit (MRL) varies from 0.0022 to 0.25 µg/L with a median MRL of 0.008 µg/L.

Table 14. Distribution of Myclobutanil Concentrations in USGS NAWQA Surface Water Monitoring Data Monitoring Data

Exposure Value	Detects (%)	Percentile								
		Max	99.9	99	95	90	80	70	60	50
Peak	20.4	0.507	0.486	0.344	0.074	0.033	0.033	0.033	0.010	0.008
Average		0.347	0.320	0.149	0.033	0.020	0.014	0.011	0.008	0.008

Groundwater Analysis: Myclobutanil is detected in groundwater (**Table 15**). The detection frequency is 0.15% (3/2061). Myclobutanil was detected in three wells. The maximum concentration 0.0338 µg/L is for a well (USGS Sampling Station # 295358095374101) in Harris County, TX. Land use in the Harris County recharge zone is designated as urban. The minimum reporting limit (MRL) varies from 0.0022 to 0.033 µg/L with a median MRL of 0.008 µg/L.

Table 15. Distribution of Myclobutanil Concentrations in USGS NAWQA Groundwater Monitoring Data Monitoring Data

Station ID	Concentration (µg/L)	Well Description
295358095374101	0.0338	Harris County, TX; Well Depth 33.5 ft: Urban Land Use
322237086112101	0.0208	Montgomery County, AL; Well Depth 31.5 ft; Urban Land Use
465509119371501	0.0079	Grant County, Washington; Well Depth 15 ft; Ag Land Use

Myclobutanil has been detected in ambient surface water and groundwater in samples collected for the USGS's National Water Quality Assessment Program (NAWQA, 2007). Twenty percent

(20.4%) of 2647 surface water samples had detectable levels of myclobutanil. The maximum peak concentration for surface water detected was 0.51μg/L and the maximum average concentration is 0.35μg/L. The minimum reporting limit (MRL) varied from 0.00022 to 0.25 μg/L. In NAWQA, less than 1% (3 wells) of 2061 wells had detectable levels of myclobutanil with MRLs ranging from 0.0022 to 0.033 μg/L. These monitoring studies were not specifically conducted for myclobutanil. Additionally, myclobutanil is generally not included in many monitoring studies. Myclobutanil was detected in a limited number of samples collected at different at drinking water sources. When detections occurred, 1- to 2 percent of the samples contained low levels of myclobutanil. The maximum concentration was of 0.019 μg/L.

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Appendix 1. Additional Environmental Fate Discussion

The method used to determine the aerobic soil metabolism (MRID 164561) half-lives (61 to 71 days; MRID 00164561, page 5) reported in earlier DERs could not be replicated. The half-lives appear to have been obtained by only considering a portion of the data (<than 90 days). The pattern of decline appears to fit the common degradation pattern termed the "hockey stick". An analysis of degradation kinetics was conducted to derive the best description of the measured decline curves in aerobic soil metabolism studies. The entire data set (0 to 367 days) and a portion of the data (0 to 90 days) were analyzed using linear regression of the ln-transformed data and non-linear regression of the untransformed data.

The following equations and assumptions were made (based upon draft guidance being developed by the Fate Tech Team, Eckel, 1/2007.

eq 1. $dC/dt = -kC^n$

if n=1, then $\ln(C_0/C) = -kt$ (first order equation)

if $n \neq 1$ then

eq. 2. $(1/(n-1))*((1/C^{n-1}) - (1/C_0^{n-1})) = -kt$

C =((n-1)*k*t + (1/co^(n-1)))^(-1/(n-1)); co = Co/100

The rings of myclobutanil, triazole and chlorophenyl rings were labeled [^{14}C), thus, the decline (of radioactivity) of myclobutanil was measured by each ring. The formation and decline of 1,2,4-triazole could also be tracked with the triazole ring.

Assuming first-order kinetics (*eq. 1*) a half-life ($T_{½}$) was calculated using linear regression on the ln-transformed concentration versus time (time = 0 to 90 days or time = 0 to 367) and a DT_{50} was calculated using non-liner regression (the Levenberg-Marquardt least squares method for curve fitting) of concentration versus time (time = 0 to 90 days or time = 0 to 367). The decay rate (k, or slope) and R^2 are summarized in **Appendix 1, Table 1**.

The second equation (*eq 2.*) result using all the data (0 to 367 days) fit the data points (Levenberg-Marquardt least squares), but was not a first order.

Appendix 1. Table 1. Summary of regression method, time, decay rate, coefficient of determination (R^2), intercept, and reaction order.

Parent (myclobutanil)					
Regression		Time (days)	k ($days^{-1}$)	R^2	n
Linear	lnC = lnCo exp (-kt)	90	0.0096[a] 0.0077[b]	0.99 0.97	1 1
Linear		367	0.0035 0.0031	0.81 0.82	1 1
Nonlinear	C=CoExp(-kt)	90	0.10 0.0091	0.99 0.95	1 1
		367	0.0067	0.83	1

Appendix 1. Table 1. Summary of regression method, time, decay rate, coefficient of determination (R^2), intercept, and reaction order.					
Parent (myclobutanil)					
Regression		Time (days)	k ($days^{-1}$)	R^2	n
			0.0058	0.77	1
Nonlinear-N^{st} order	C[c]	367	0.01676	0.98	n = 2.929 co = 1.012
Myclobutanil + 1,2,4-triazole					
Regression	lnC = lnCo exp (-kt)	Time (days)			
Linear		90	0.0058[a]	0.96	1
Linear		367	0.0022	0.85	1
Nonlinear	C=CoExp(-kt)	90	0.0069	0.92	1
Nonlinear		367	0.0037	0.68	1
Nonlinear-N^{st} order	C[c]	367	0.01434	0.978	n = 4.789 co = 0.978

[a] Triazole ring labeled will include 1,2,4-triazole.

[b] Chlorophenyl ring label.(1,2,4-triazole not label)

[c] C =((n-1)*k*t + (1/co^(n-1)))^(-1/(n-1)); co = Co/100

Appendix 1. Table 2 summarizes the distribution of measured radioactivity, and the estimated half-life or DT_{50}, DT_{75}, and 367 days (end of study). The rate constant (k /day) and coefficient of determination (R^2) is also shown. From a statistical stand point (the linear and nonlinear methods) were significant (slopes) and the R^2 were fair to good, and therefore, acceptable. But in reality the linear or nonlinear methods did not fit the data very well. Either the method it fit the data well at times less than 90 days, but not at day 367 or more, or it fit at both ends, but not in the middle.

The non-linear, n-order curve fitting equation (*eq. 2*) fit the data also exactly. Unfortunately, it is not a first-order equation.

In summary, neither the first-order linear regression nor nonlinear regression (curve fitting) gives totally satisfactory results. When only part of the data is used the initial decline can be fit quite well, but the later data is underestimated. Using all the data, over estimated the half-life (or DT_{50}), but under estimated the DT_{70} or DT_{90}. The first-order linear regression (transform data), using all the data, was the only method that gave a reasonable estimate of the residue remaining at the end of the study (367). Neither DT_{75} or DT_{90} were reached in the study, the residues remaining at day 367 was used to evaluate the results. This was selected because it was the most conservative as it fit the data best at both the beginning and end of the study. This would result in a conservative estimate of myclobutanil concentrations in water.

Appendix 1, Table 2. Summary of half-lives, DT50, DT75, DT90, and decay rate of myclobutanil and myclobutanil + 1,2,4 triazole estimated by linear and non-linear regression.						
PARENT ONLY	Half-life or DT50 50% decline	DT75 75% decline	DT90 90% decline	% Radioactivity at 367 days	Rate constant	Coefficient of Determination
Triazole Label Position	Time (days)				$Days^{-1}$	R^2
Observed Myclobutanil	75	>365	>365	29		
Liner Regression (t <100 days)	72.2	144	239	3.0	0.0096	0.99
Linear Regression (all)	**198.0**	**396**	**657**	**27.9**	**0.0035**	**0.81**
Nonlinear 1st order (t <100 days)	69.3	138	230	2.6	0.010	0.99
Nonlinear 1st order	103.5	206	343	8.7	0.0067	0.83
Nonlinear nst order	87.6	400	2600	26.7	0.0167	0.98
Observed Chlorophenyl Label	90	>365	>365	33		
Liner Regression (t <100 days)	90	180	299	6.0	0.0077	0.97
Linear Regression (all)	**224**	**447**	**742**	**32.3**	**0.0031**	**0.82**
Nonlinear 1st order (t<100 days)	76	152	253	3.6	0.0091	0.95
Nonlinear 1st order	113	237	354	11.6	0.0059	0.77
Nonlinear nst order	103	630	>1000	31.2	0.0164	0.98
PARENT + DEGRADATE						
Observed Myclobutanil + 1,2,4 triazole	220	>365	>365	42		
Liner Regression (t <100 days)	119.5	239	397	12.0	0.0058	0.96
Linear Regression (all)	315.1	630	1047	44.8	0.0022	0.85
Nonlinear 1st order (t<100 days)	100.5	201	334	8.1	0.0069	0.92
Nonlinear 1st order	186.3	372	619	25.9	0.0037	0.68
Nonlinear nst order	235.2			44.85	0.0144	0.98

APPENDIX 2. FIRST and SCI-GROW OUTPUTS

RUN No. 1 FOR myclobutanil mea ON grass * INPUT VALUES *

RATE (#/AC) ONE(MULT)	No.APPS & INTERVAL	SOIL Kd	SOLUBIL (PPM)	APPL TYPE (%DRIFT)	%CROPPED AREA	INCORP (IN)
.200(.756)	4 14	5.0	142.0	AERIAL(16.0)	100.0	.0

FIELD AND RESERVOIR HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (RESERVOIR)	PHOTOLYSIS (RES.-EFF)	METABOLIC (RESER.)	COMBINED (RESER.)
251.00	2	N/A	.00- .00	.00	.00

UNTREATED WATER CONC (MICROGRAMS/LITER (PPB)) Ver 1.1.0 JAN 1, 2007

PEAK DAY (ACUTE) CONCENTRATION	ANNUAL AVERAGE (CHRONIC) CONCENTRATION
46.898	17.153

RUN No. 1 FOR 124triazole ON grass * INPUT VALUES *

RATE (#/AC) ONE(MULT)	No.APPS & INTERVAL	SOIL Kd	SOLUBIL (PPM)	APPL TYPE (%DRIFT)	%CROPPED AREA	INCORP (IN)
.015(.055)	4 14	.7*******		AERIAL(16.0)	100.0	.0

FIELD AND RESERVOIR HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (RESERVOIR)	PHOTOLYSIS (RES.-EFF)	METABOLIC (RESER.)	COMBINED (RESER.)
250.00	2	161.00	.00- .00	.00	161.00

UNTREATED WATER CONC (MICROGRAMS/LITER (PPB)) Ver 1.1.0 JAN 1, 2007

PEAK DAY (ACUTE) CONCENTRATION	ANNUAL AVERAGE (CHRONIC) CONCENTRATION
5.281	1.723

SCIGROW Model Output File: (Parent Only) Grass Grown for Seed, Grass Pastures, Rangeland, and Sod Farms

```
    SCIGROW
                        VERSION 2.3
              ENVIRONMENTAL FATE AND EFFECTS DIVISION
                   OFFICE OF PESTICIDE PROGRAMS
               U.S. ENVIRONMENTAL PROTECTION AGENCY
                          SCREENING MODEL
                  FOR AQUATIC PESTICIDE EXPOSURE

SciGrow version 2.3
chemical:1,2,4-triazole
time is 10/10/2012  13:22:30
-------------------------------------------------------------------------
 Application      Number of       Total Use    Koc      Soil Aerobic
 rate (lb/acre)  applications   (lb/acre/yr)  (ml/g)   metabolism (days)
-------------------------------------------------------------------------
     0.015           4.0           0.059      1.04E+02      250.0
-------------------------------------------------------------------------
groundwater screening cond (ppb) =   2.44E-01
*************************************************************************
```

PRZM-GW Input Florida Citrus Parent Myclobutanil

```
10/10/2012 1:33:15 PM; myclobutanil parent; Florida Citrus - FL Central
Ridge, Polk County - (Tampa) Met File (12842.dvf) - Astatula sand, hrgb A
User Interface Version: PRZM-GW (Version 1.00)
***Record 3
    0.78       0       0      33       1       1
***Record 6
       0
***Record 8
       1
***Record 9
       1    0.25     200      60       1  10  10  10       0     100
***Record 10
      30
***Record 11
  010161  010261  311261       1
  010162  010262  311262       1
  010163  010263  311263       1
  010164  010264  311264       1
  010165  010265  311265       1
  010166  010266  311266       1
  010167  010267  311267       1
  010168  010268  311268       1
  010169  010269  311269       1
  010170  010270  311270       1
  010171  010271  311271       1
  010172  010272  311272       1
  010173  010273  311273       1
  010174  010274  311274       1
  010175  010275  311275       1
  010176  010276  311276       1
  010177  010277  311277       1
  010178  010278  311278       1
  010179  010279  311279       1
  010180  010280  311280       1
  010181  010281  311281       1
  010182  010282  311282       1
  010183  010283  311283       1
  010184  010284  311284       1
  010185  010285  311285       1
  010186  010286  311286       1
  010187  010287  311287       1
  010188  010288  311288       1
  010189  010289  311289       1
  010190  010290  311290       1
***Record 12
Place Holder
***Record 13
     120       1       0       0
***Record 15
Place Holder
***Record 16
  10 261  0 2    4 0.224    1    0
  24 261  0 2    4 0.224    1    0
  10 361  0 2    4 0.224    1    0
  24 361  0 2    4 0.224    1    0
```

```
10 262   0 2     4 0.224     1     0
24 262   0 2     4 0.224     1     0
10 362   0 2     4 0.224     1     0
24 362   0 2     4 0.224     1     0
10 263   0 2     4 0.224     1     0
24 263   0 2     4 0.224     1     0
10 363   0 2     4 0.224     1     0
24 363   0 2     4 0.224     1     0
10 264   0 2     4 0.224     1     0
24 264   0 2     4 0.224     1     0
10 364   0 2     4 0.224     1     0
24 364   0 2     4 0.224     1     0
10 265   0 2     4 0.224     1     0
24 265   0 2     4 0.224     1     0
10 365   0 2     4 0.224     1     0
24 365   0 2     4 0.224     1     0
10 266   0 2     4 0.224     1     0
24 266   0 2     4 0.224     1     0
10 366   0 2     4 0.224     1     0
24 366   0 2     4 0.224     1     0
10 267   0 2     4 0.224     1     0
24 267   0 2     4 0.224     1     0
10 367   0 2     4 0.224     1     0
24 367   0 2     4 0.224     1     0
10 268   0 2     4 0.224     1     0
24 268   0 2     4 0.224     1     0
10 368   0 2     4 0.224     1     0
24 368   0 2     4 0.224     1     0
10 269   0 2     4 0.224     1     0
24 269   0 2     4 0.224     1     0
10 369   0 2     4 0.224     1     0
24 369   0 2     4 0.224     1     0
10 270   0 2     4 0.224     1     0
24 270   0 2     4 0.224     1     0
10 370   0 2     4 0.224     1     0
24 370   0 2     4 0.224     1     0
10 271   0 2     4 0.224     1     0
24 271   0 2     4 0.224     1     0
10 371   0 2     4 0.224     1     0
24 371   0 2     4 0.224     1     0
10 272   0 2     4 0.224     1     0
24 272   0 2     4 0.224     1     0
10 372   0 2     4 0.224     1     0
24 372   0 2     4 0.224     1     0
10 273   0 2     4 0.224     1     0
24 273   0 2     4 0.224     1     0
10 373   0 2     4 0.224     1     0
24 373   0 2     4 0.224     1     0
10 274   0 2     4 0.224     1     0
24 274   0 2     4 0.224     1     0
10 374   0 2     4 0.224     1     0
24 374   0 2     4 0.224     1     0
10 275   0 2     4 0.224     1     0
24 275   0 2     4 0.224     1     0
10 375   0 2     4 0.224     1     0
24 375   0 2     4 0.224     1     0
10 276   0 2     4 0.224     1     0
```

```
24 276  0 2    4 0.224    1    0
10 376  0 2    4 0.224    1    0
24 376  0 2    4 0.224    1    0
10 277  0 2    4 0.224    1    0
24 277  0 2    4 0.224    1    0
10 377  0 2    4 0.224    1    0
24 377  0 2    4 0.224    1    0
10 278  0 2    4 0.224    1    0
24 278  0 2    4 0.224    1    0
10 378  0 2    4 0.224    1    0
24 378  0 2    4 0.224    1    0
10 279  0 2    4 0.224    1    0
24 279  0 2    4 0.224    1    0
10 379  0 2    4 0.224    1    0
24 379  0 2    4 0.224    1    0
10 280  0 2    4 0.224    1    0
24 280  0 2    4 0.224    1    0
10 380  0 2    4 0.224    1    0
24 380  0 2    4 0.224    1    0
10 281  0 2    4 0.224    1    0
24 281  0 2    4 0.224    1    0
10 381  0 2    4 0.224    1    0
24 381  0 2    4 0.224    1    0
10 282  0 2    4 0.224    1    0
24 282  0 2    4 0.224    1    0
10 382  0 2    4 0.224    1    0
24 382  0 2    4 0.224    1    0
10 283  0 2    4 0.224    1    0
24 283  0 2    4 0.224    1    0
10 383  0 2    4 0.224    1    0
24 383  0 2    4 0.224    1    0
10 284  0 2    4 0.224    1    0
24 284  0 2    4 0.224    1    0
10 384  0 2    4 0.224    1    0
24 384  0 2    4 0.224    1    0
10 285  0 2    4 0.224    1    0
24 285  0 2    4 0.224    1    0
10 385  0 2    4 0.224    1    0
24 385  0 2    4 0.224    1    0
10 286  0 2    4 0.224    1    0
24 286  0 2    4 0.224    1    0
10 386  0 2    4 0.224    1    0
24 386  0 2    4 0.224    1    0
10 287  0 2    4 0.224    1    0
24 287  0 2    4 0.224    1    0
10 387  0 2    4 0.224    1    0
24 387  0 2    4 0.224    1    0
10 288  0 2    4 0.224    1    0
24 288  0 2    4 0.224    1    0
10 388  0 2    4 0.224    1    0
24 388  0 2    4 0.224    1    0
10 289  0 2    4 0.224    1    0
24 289  0 2    4 0.224    1    0
10 389  0 2    4 0.224    1    0
24 389  0 2    4 0.224    1    0
10 290  0 2    4 0.224    1    0
24 290  0 2    4 0.224    1    0
```

```
  10 390  0 2    4 0.224    1    0
  24 390  0 2    4 0.224    1    0
***Record 17
       0       3       0
***Record 18
       0       0     0.5
***Record 19
Place Holder
***Record 20
     400           0   0   0   0   0   2   1   1   0
***Record 26
       0       0       0
***Record 27
       4     0.1    0.90     7.0
***Record 31
    2    2    2    2    2    2    2    2    2    2    2    2 0.97 10.0
***Record 32
   21   21   21   21   21   21   21   21   21   21   21   21
***Record 32A
    2.00    25.0
***Record 33
       8
*** Record 34,36,37 Horizon 1
       1      10    1.35    0.11       0       0       0
         0.00276 0.00276       0
               1    0.11   0.014   0.144    5.03
              21      96     2.4       0       0
*** Record 34,36,37 Horizon 2
       2      10    1.58     0.1       0       0       0
         0.00261 0.00261       0
               5     0.1   0.016   0.144    5.03
              21      95     2.8       0       0
*** Record 34,36,37 Horizon 3
       3      20    1.58     0.1       0       0       0
         0.00215 0.00215       0
              20     0.1   0.016    1.44    5.03
              21      95     2.8       0       0
*** Record 34,36,37 Horizon 4
       4      20    1.45     0.2       0       0       0
         0.00153 0.00153       0
              20     0.2   0.015   0.144    5.03
              21      95     2.8       0       0
*** Record 34,36,37 Horizon 5
       5      20     1.5     0.1       0       0       0
         0.00092 0.00092       0
              20     0.1   0.015   0.144    5.03
              21      95     2.8       0       0
*** Record 34,36,37 Horizon 6
       6      20     1.5    0.24       0       0       0
        0.0003070.000307       0
              20    0.24   0.015   0.144    5.03
              21      95     2.8       0       0
*** Record 34,36,37 Horizon 7
       7     200    1.59    0.10       0       0       0
              0       0       0
              50    0.10   0.014   0.144    5.03
              21      96     2.8       0       0
```

```
*** Record 34,36,37 Horizon 8
       8     100    1.58  0.3997       0       0       0
               0       0       0
              50  0.3997   0.001   0.144    5.03
              21      87      11       0       0
*** Record 40
       0
*** Record 42
            YEAR      10            YEAR      10            YEAR      10   0
*** Record 45
       3    YEAR
*** Record 46
    DCON1   TAVE  21  22  1.0E3
    INFL    TCUM  21  21  0.0244
    IRRG    TSER
```

PRZM-GW Input Florida Citrus 1,2,4-Triazole

```
10/10/2012 1:46:58 PM; 1,2,4-triazol; Florida Citrus - FL Central Ridge, Polk
County - (Tampa) Met File (12842.dvf) - Astatula sand, hrgb A
User Interface Version: PRZM-GW (Version 1.00)
***Record 3
    0.78       0       0      33       1       1
***Record 6
       0
***Record 8
       1
***Record 9
       1    0.25     200      60       1  10  10  10       0     100
***Record 10
      30
***Record 11
  010161  010261  311261       1
  010162  010262  311262       1
  010163  010263  311263       1
  010164  010264  311264       1
  010165  010265  311265       1
  010166  010266  311266       1
  010167  010267  311267       1
  010168  010268  311268       1
  010169  010269  311269       1
  010170  010270  311270       1
  010171  010271  311271       1
  010172  010272  311272       1
  010173  010273  311273       1
  010174  010274  311274       1
  010175  010275  311275       1
  010176  010276  311276       1
  010177  010277  311277       1
  010178  010278  311278       1
  010179  010279  311279       1
  010180  010280  311280       1
  010181  010281  311281       1
  010182  010282  311282       1
  010183  010283  311283       1
```

```
  010184  010284  311284       1
  010185  010285  311285       1
  010186  010286  311286       1
  010187  010287  311287       1
  010188  010288  311288       1
  010189  010289  311289       1
  010190  010290  311290       1
***Record 12
Place Holder
***Record 13
     120       1       0       0
***Record 15
Place Holder
***Record 16
  10 261  0 2    40.0164    1    0
  24 261  0 2    40.0164    1    0
  10 361  0 2    40.0164    1    0
  24 361  0 2    40.0164    1    0
  10 262  0 2    40.0164    1    0
  24 262  0 2    40.0164    1    0
  10 362  0 2    40.0164    1    0
  24 362  0 2    40.0164    1    0
  10 263  0 2    40.0164    1    0
  24 263  0 2    40.0164    1    0
  10 363  0 2    40.0164    1    0
  24 363  0 2    40.0164    1    0
  10 264  0 2    40.0164    1    0
  24 264  0 2    40.0164    1    0
  10 364  0 2    40.0164    1    0
  24 364  0 2    40.0164    1    0
  10 265  0 2    40.0164    1    0
  24 265  0 2    40.0164    1    0
  10 365  0 2    40.0164    1    0
  24 365  0 2    40.0164    1    0
  10 266  0 2    40.0164    1    0
  24 266  0 2    40.0164    1    0
  10 366  0 2    40.0164    1    0
  24 366  0 2    40.0164    1    0
  10 267  0 2    40.0164    1    0
  24 267  0 2    40.0164    1    0
  10 367  0 2    40.0164    1    0
  24 367  0 2    40.0164    1    0
  10 268  0 2    40.0164    1    0
  24 268  0 2    40.0164    1    0
  10 368  0 2    40.0164    1    0
  24 368  0 2    40.0164    1    0
  10 269  0 2    40.0164    1    0
  24 269  0 2    40.0164    1    0
  10 369  0 2    40.0164    1    0
  24 369  0 2    40.0164    1    0
  10 270  0 2    40.0164    1    0
  24 270  0 2    40.0164    1    0
  10 370  0 2    40.0164    1    0
  24 370  0 2    40.0164    1    0
  10 271  0 2    40.0164    1    0
  24 271  0 2    40.0164    1    0
  10 371  0 2    40.0164    1    0
```

```
24 371  0 2    40.0164    1    0
10 272  0 2    40.0164    1    0
24 272  0 2    40.0164    1    0
10 372  0 2    40.0164    1    0
24 372  0 2    40.0164    1    0
10 273  0 2    40.0164    1    0
24 273  0 2    40.0164    1    0
10 373  0 2    40.0164    1    0
24 373  0 2    40.0164    1    0
10 274  0 2    40.0164    1    0
24 274  0 2    40.0164    1    0
10 374  0 2    40.0164    1    0
24 374  0 2    40.0164    1    0
10 275  0 2    40.0164    1    0
24 275  0 2    40.0164    1    0
10 375  0 2    40.0164    1    0
24 375  0 2    40.0164    1    0
10 276  0 2    40.0164    1    0
24 276  0 2    40.0164    1    0
10 376  0 2    40.0164    1    0
24 376  0 2    40.0164    1    0
10 277  0 2    40.0164    1    0
24 277  0 2    40.0164    1    0
10 377  0 2    40.0164    1    0
24 377  0 2    40.0164    1    0
10 278  0 2    40.0164    1    0
24 278  0 2    40.0164    1    0
10 378  0 2    40.0164    1    0
24 378  0 2    40.0164    1    0
10 279  0 2    40.0164    1    0
24 279  0 2    40.0164    1    0
10 379  0 2    40.0164    1    0
24 379  0 2    40.0164    1    0
10 280  0 2    40.0164    1    0
24 280  0 2    40.0164    1    0
10 380  0 2    40.0164    1    0
24 380  0 2    40.0164    1    0
10 281  0 2    40.0164    1    0
24 281  0 2    40.0164    1    0
10 381  0 2    40.0164    1    0
24 381  0 2    40.0164    1    0
10 282  0 2    40.0164    1    0
24 282  0 2    40.0164    1    0
10 382  0 2    40.0164    1    0
24 382  0 2    40.0164    1    0
10 283  0 2    40.0164    1    0
24 283  0 2    40.0164    1    0
10 383  0 2    40.0164    1    0
24 383  0 2    40.0164    1    0
10 284  0 2    40.0164    1    0
24 284  0 2    40.0164    1    0
10 384  0 2    40.0164    1    0
24 384  0 2    40.0164    1    0
10 285  0 2    40.0164    1    0
24 285  0 2    40.0164    1    0
10 385  0 2    40.0164    1    0
24 385  0 2    40.0164    1    0
```

```
  10 286  0 2    40.0164    1    0
  24 286  0 2    40.0164    1    0
  10 386  0 2    40.0164    1    0
  24 386  0 2    40.0164    1    0
  10 287  0 2    40.0164    1    0
  24 287  0 2    40.0164    1    0
  10 387  0 2    40.0164    1    0
  24 387  0 2    40.0164    1    0
  10 288  0 2    40.0164    1    0
  24 288  0 2    40.0164    1    0
  10 388  0 2    40.0164    1    0
  24 388  0 2    40.0164    1    0
  10 289  0 2    40.0164    1    0
  24 289  0 2    40.0164    1    0
  10 389  0 2    40.0164    1    0
  24 389  0 2    40.0164    1    0
  10 290  0 2    40.0164    1    0
  24 290  0 2    40.0164    1    0
  10 390  0 2    40.0164    1    0
  24 390  0 2    40.0164    1    0
***Record 17
       0       3       0
***Record 18
       0       0     0.5
***Record 19
Place Holder
***Record 20
     400           0   0   0   0   0   2   1   1   0
***Record 26
       0       0       0
***Record 27
       4     0.1    0.90     7.0
***Record 31
    2    2    2    2    2    2    2    2    2    2    2    2 0.97 10.0
***Record 32
   21   21   21   21   21   21   21   21   21   21   21   21
***Record 32A
    2.00    25.0
***Record 33
       8
*** Record 34,36,37 Horizon 1
       1      10    1.35    0.11       0       0       0
         0.00431 0.00277       0
               1    0.11   0.014   0.144    0.72
              21      96     2.4       0       0
*** Record 34,36,37 Horizon 2
       2      10    1.58     0.1       0       0       0
         0.00431 0.00262       0
               5     0.1   0.016   0.144    0.72
              21      95     2.8       0       0
*** Record 34,36,37 Horizon 3
       3      20    1.58     0.1       0       0       0
         0.00431 0.00216       0
              20     0.1   0.016    1.44    0.72
              21      95     2.8       0       0
*** Record 34,36,37 Horizon 4
       4      20    1.45     0.2       0       0       0
```

```
         0.00431 0.00154       0
              20     0.2   0.015   0.144    0.72
              21      95     2.8       0       0
*** Record 34,36,37 Horizon 5
       5      20     1.5     0.1       0       0       0
         0.004310.000924       0
              20     0.1   0.015   0.144    0.72
              21      95     2.8       0       0
*** Record 34,36,37 Horizon 6
       6      20     1.5    0.24       0       0       0
         0.004310.000308       0
              20    0.24   0.015   0.144    0.72
              21      95     2.8       0       0
*** Record 34,36,37 Horizon 7
       7     200    1.59    0.10       0       0       0
         0.00431       0       0
              50    0.10   0.014   0.144    0.72
              21      96     2.8       0       0
*** Record 34,36,37 Horizon 8
       8     100    1.58  0.3997       0       0       0
         0.00431       0       0
              50  0.3997   0.001   0.144    0.72
              21      87      11       0       0
*** Record 40
       0
*** Record 42
            YEAR      10            YEAR      10            YEAR      10   0
*** Record 45
       3    YEAR
*** Record 46
    DCON1   TAVE  21  22  1.0E3
    INFL    TCUM  21  21   0.028
    IRRG    TSER
```

PRZM/EXAMS for maximum turfgrass use (6 applications @ 1.3 lb a.i./acre)

```
stored as PAturf6u.out
Chemical: Myclobutanil
PRZM environment: PAturfSTD.txt     modified Thuday, 23 February 2006 at
17:55:08
EXAMS environment: ir298.exv  modified Tueday, 26 August 2008 at 05:14:08
Metfile: w14751.dvf     modified Tueday, 26 August 2008 at 05:15:00
Water segment concentrations (ppb)

Year  Peak  96 hr 21 Day      60 Day      90 Day      Yearly
1961  57.05 56.76 55.65 53.39 51.54 16.45
1962  98.72 98.31 97.34 94.72 92.56 55.2
1963  116   116   114   111   108   83.36
1964  119   119   117   115   113   96.07
1965  121   121   119   116   114   97.89
1966  221   220   217   215   212   127
1967  196   195   193   187   183   163
1968  182   181   178   175   173   145
1969  163   162   160   156   153   138
1970  140   139   137   133   130   119
1971  136   135   133   130   128   112
```

1972	143	143	141	136	130	110
1973	250	249	246	242	240	149
1974	223	223	220	213	208	191
1975	255	254	251	249	246	183
1976	230	229	226	219	215	195
1977	197	197	194	189	185	166
1978	161	160	158	154	151	137
1979	165	165	162	159	156	126
1980	186	185	182	176	165	133
1981	166	166	164	159	156	141
1982	141	140	139	135	133	123
1983	130	129	127	124	122	112
1984	121	120	119	116	114	103
1985	152	152	149	146	144	107
1986	136	136	134	130	127	117
1987	148	147	145	142	139	112
1988	134	133	132	128	125	116
1989	146	145	143	139	136	112
1990	139	139	137	132	130	115

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day		90 Day		Yearly
0.032258064516129	255		254	251	249	246	195	
0.0645161290322581			250	249	246	242	240	191
0.0967741935483871			230	229	226	219	215	183
0.129032258064516	223		223	220	215	212	166	
0.161290322580645	221		220	217	213	208	163	
0.193548387096774	197		197	194	189	185	149	
0.225806451612903	196		195	193	187	183	145	
0.258064516129032	186		185	182	176	173	141	
0.290322580645161	182		181	178	175	165	138	
0.32258064516129	166		166	164	159	156	137	
0.354838709677419	165		165	162	159	156	133	
0.387096774193548	163		162	160	156	153	127	
0.419354838709677	161		160	158	154	151	126	
0.451612903225806	152		152	149	146	144	123	
0.483870967741936	148		147	145	142	139	119	
0.516129032258065	146		145	143	139	136	117	
0.548387096774194	143		143	141	136	133	116	
0.580645161290323	141		140	139	135	130	115	
0.612903225806452	140		139	137	133	130	112	
0.645161290322581	139		139	137	132	130	112	
0.67741935483871	136		136	134	130	128	112	
0.709677419354839	136		135	133	130	127	112	
0.741935483870968	134		133	132	128	125	110	
0.774193548387097	130		129	127	124	122	107	
0.806451612903226	121		121	119	116	114	103	
0.838709677419355	121		120	119	116	114	97.89	
0.870967741935484	119		119	117	115	113	96.07	
0.903225806451613	116		116	114	111	108	83.36	
0.935483870967742	98.72		98.31	97.34	94.72	92.56	55.2	
0.967741935483871	57.05		56.76	55.65	53.39	51.54	16.45	
0.1	229.3	228.4	225.4	218.6	214.7	181.3		

Average of yearly averages: 123.365666666667

Inputs generated by pe5.pl - Novemeber 2006

```
Data used for this run:
Output File: PAturf6u
Metfile:    w14751.dvf
PRZM scenario:    PAturfSTD.txt
EXAMS environment file: ir298.exv
Chemical Name:    Myclobutanil
Description Variable Name     Value Units Comments
Molecular weight  mwt   288.8 g/mol
Henry's Law Const.      henry 2.6e-8      atm-m^3/mol
Vapor Pressure    vapr  9.75e-6     torr
Solubility  sol   142   mg/L
Kd    Kd    5.03  mg/L
Koc   Koc         mg/L
Photolysis half-life    kdp   0     days  Half-life
Aerobic Aquatic Metabolism    kbacw 1283.48     days  Halfife
Anaerobic Aquatic Metabolism  kbacs 0     days  Halfife
Aerobic Soil Metabolism asm   251   days  Halfife
Hydrolysis: pH 7  0     days  Half-life
Method:     CAM   2     integer     See PRZM manual
Incorporation Depth:    DEPI  4     cm
Application Rate: TAPP  1.456 kg/ha
Application Efficiency: APPEFF      0.95  fraction
Spray Drift DRFT  0.16  fraction of application rate applied to pond
Application Date  Date  15-8  dd/mm or dd/mmm or dd-mm or dd-mmm
Interval 1  interval    14    days  Set to 0 or delete line for single app.
app. rate 1 apprate     1.456 kg/ha
Interval 2  interval    14    days  Set to 0 or delete line for single app.
app. rate 2 apprate     1.456 kg/ha
Interval 3  interval    14    days  Set to 0 or delete line for single app.
app. rate 3 apprate     1.456 kg/ha
Interval 4  interval    14    days  Set to 0 or delete line for single app.
app. rate 4 apprate     1.456 kg/ha
Interval 5  interval    14    days  Set to 0 or delete line for single app.
app. rate 5 apprate     1.456 kg/ha
Record 17:  FILTRA
      IPSCND      1
      UPTKF
Record 18:  PLVKRT
      PLDKRT
      FEXTRC      0.5
Flag for Index Res. Run IR    Reservoir
Flag for runoff calc.   RUNOFF      total none, monthly or total(average of
entire run)
```